CLAIMS

What is claimed is:

1. A system for cooling electronic components, comprising:

a structure defining a plurality of spaces, each space having an inlet and an outlet and being otherwise generally enclosed and containing at least one of the electronic components mounted therein;

at least one heat exchanger being one of adjoining the structure at the inlets of the spaces and disposed within the plurality of spaces at the inlets of the spaces, the heat exchanger being configured to channel a heat exchange fluid to cool air as air flows therethrough;

a fan disposed in each of the plurality of the spaces configured to pull air through the inlet via the heat exchanger, to direct air past the at least one electronic component mounted in the space to cool the electronic component, and to exhaust the air through the outlet; and

a cooling module in fluid communication with the at least one heat exchanger for cooling the heat exchange fluid, the cooling module being located remote to the spaces.

2. The system of claim 1, comprising a plurality of the heat exchangers, each heat exchanger corresponding to one of the plurality of spaces.

3. The system of claim 1, wherein the structure is a rack structure and the electronic components are computer components mounted on shelves of the rack structure, each shelf corresponding to one of the spaces, and wherein the system comprises a plurality of the rack structures.

4. The system of claim 1, further comprising a fan controller corresponding to each fan, the fan controller being configured to variably control a speed of the corresponding fan according to at least one of a temperature within the corresponding space and a temperature of at least one of the at least one electronic component mounted within the corresponding space.

5. The system of claim 1, further comprising:

a valve in fluid communication with the heat exchanger and the cooling module for modulating flow rate of the heat exchange fluid therebetween; and

a valve controller configured to control the valve according to at least one of a temperature and a pressure of the heat exchange fluid.

6. The system of claim 1, wherein the cooling module is a direction expansion condensing unit.

7. The system of claim 1, wherein the heat exchange fluid is selected from the group comprising water, phase change refrigerants, chilled air, brine, antifreeze mix, and oil.

8. The system of claim 1, wherein each heat exchanger includes a heat exchange fluid channeling device and a heat exchange apparatus in thermal communication with the heat exchange fluid channeling device.

9. The system of claim 8, wherein the heat exchange apparatus includes a plurality of heat exchange fins through which the heat exchange fluid channeling device extends.

10. The system of claim 8, wherein the heat exchange fluid channeling device comprises an external member and an inner baffle defining an annular channel therebetween and through which the heat exchange fluid flows.

11. The system of claim 8, wherein the heat exchange fluid channeling device is U-shaped and includes a supply portion to supply the heat exchange fluid from the cooling module to the heat exchange apparatus and to return the heat exchange fluid to the cooling module.

12. The system of claim 1, further comprising a facility containing a plurality of the structures, a plurality of the heat exchangers and the fans, wherein the air drawn by the fans is ambient air in the facility.

13. A system for cooling electronic components, comprising:

means for defining a plurality of spaces, each space having an inlet and an outlet and being otherwise generally enclosed and containing at least one of the electronic components mounted therein;

means for containing a plurality of the means for defining the spaces;

means for cooling air, the means for cooling air being one of adjoining the inlets of the spaces and disposed within the plurality of spaces at the inlets of the spaces; and

means for directing the air from ambient air in the means for containing through the inlet to the outlet of the spaces and past the means for cooling.

14. The system of claim 13, comprising a plurality of the means for cooling air, each means for cooling air corresponding to one of the plurality of spaces.

15. The system of claim 13, wherein the means for containing is a rack structure and the electronic components are computer components mounted on shelves of the rack structure, each shelf corresponding to one of the spaces, and wherein the system comprises a plurality of the rack structures.

16. The system of claim 13, wherein the means for direction including means for variably controlling flow rate of the air, wherein the means for variably controlling is according to at least one of a temperature within the corresponding space and a temperature of at least one of the at least one electronic component mounted within the corresponding space.

17. The system of claim 13, wherein the means for cooling air includes means for controlling a flow rate of a heat exchange fluid of the means for cooling air, the controlling being according to at least one of a temperature and a pressure of the heat exchange fluid.

18. The system of claim 17, wherein the heat exchange fluid is selected from the group comprising water, phase change refrigerants, chilled air, brine, antifreeze mix, and oil.

19. The system of claim 13, wherein the means for cooling air includes means for channeling a heat exchange fluid and means for heat exchange in thermal communication with the means for channeling.

20. The system of claim 19, wherein the means for heat exchange includes a plurality of heat exchange fins through which the means for channeling the heat exchange fluid extends.

21. The system of claim 19, wherein the means for channeling the heat exchange fluid includes an annular channel through which the heat exchange fluid flows.

22. The system of claim 19, wherein the means for channeling the heat exchange fluid is U-shaped.

23. A method for cooling electronic components, comprising:

providing a structure defining a plurality of spaces, each space having an inlet and an outlet and being otherwise generally enclosed and containing at least one of the electronic components mounted therein;

moving air through the inlet of each space;

cooling the air by exchanging heat between a heat exchange fluid and the air at a location, the location being one of adjoining the structure at the inlets of the spaces and disposed within the plurality of spaces at the inlets of the spaces;

directing the air past the at least one electronic component mounted in the space to cool the electronic component; and

exhausting the air through the outlet.

24. The method of claim 23, wherein the providing the structure includes providing a plurality of rack structures in which the electronic components are mounted on shelves of the rack structures and wherein each shelf corresponds to one of the spaces.

25. The method of claim 23, further comprising controlling a speed of the air flow through each space according to at least one of a temperature within the corresponding space and a temperature of at least one of the at least one electronic component mounted within the corresponding space.

26. The method of claim 23, further comprising controlling a flow rate of the heat exchange fluid according to at least one of a temperature and a pressure of the heat exchange fluid.

27. The method of claim 23, further comprising cooling the heat exchange fluid using a compressor.

28. The method of claim 23, wherein the heat exchange fluid is selected from the group comprising water, phase change refrigerants, chilled air, brine, antifreeze mix, and oil.

29. The method of claim 23, wherein the cooling the air includes channeling the heat exchange fluid through a heat exchange fluid channeling device and directing the air through a heat exchange apparatus in thermal communication with the heat exchange fluid channeling device.

30. The method of claim 29, wherein the directing the air through the heat exchange apparatus includes directing the air through a plurality of heat exchange fins through which the heat exchange fluid channeling device extends.

31. The method of claim 29, wherein the channeling the heat exchange fluid through the heat exchange fluid channeling device includes channeling the heat exchange fluid through an annular channel defined between an external member and an inner baffle of the heat exchange fluid channeling device.

32. The method of claim 29, wherein the channeling the heat exchange fluid through the heat exchange fluid channeling device includes channeling the heat exchange fluid through a U-shaped heat exchange fluid channeling device.

33. The method of claim 23, further comprising providing a facility to contain a plurality of the structures, wherein the air moved through the inlet of each space is ambient air in the facility.